



Original article

Compilation of “Suggestions” Section in Postgraduate Theses with Scientific Research Theme in Educational Sciences

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Abstract

This study aims to compile the suggestions in the postgraduate theses prepared with the theme of "scientific research (SR) in Turkey between 2000-2022 years. In the study, 4 sub-themes were chosen for the scientific research theme; "scientific research methods (SRM)", "scientific research processes (SRP)", "scientific consistency (SC)", and "scientific self-efficacy, (SSE)". The data were obtained from the suggestions sections of the studies conducted for the keywords obtained by so-called sub-themes at the Higher Education National Thesis Center (HENTC). The document analysis method was used in the research. A total of 40 theses including 27 master's and 13 doctoral theses were compiled and reviewed in the study. Then the findings obtained by using the MAXQDA 18 package program were mapped as the percentage (%) and frequency (F) values. In the research, theses written for 4 different groups were investigated; teachers, pre-service teachers, middle school students, and graduate students. Accordingly, the findings were arranged according to the groups and interpreted. Accordingly, in studies on teachers, it was obtained findings about the need for in-service training to be given to teachers to be more experienced in scientific research and to conduct research on a wider scale. Secondly, in studies conducted for pre-service teachers, it was determined that updates should be made to include more scientific research in the curricula for pre-service teachers. On the other hand in the studies conducted for secondary school students, it was concluded that experiments and laboratory activities would contribute to students' learning of scientific processes. And finally, in the studies on graduate students, it was determined that there was a consensus that the hours and subjects of scientific research courses should be increased.

Keywords: Document Analysis, Scientific Research, Suggestions, Self-efficacy.

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INTRODUCTION

The field of interest that uses the research required to solve a problem is called "science" (Ramig et al., 1995). In the process of the occurs of science, the discoveries made by scientists have a big role to play. In the discoveries made, scientists also use scientific process skills (Abruscato, 2000). Although the school environment, where science process skills are actively used, is very important, it should be considered that these skills are skills that can be used not only in schools but also in daily life (Rillero, 1998; Ergin et al., 2005). In solving a problem encountered in everyday life, it is useful to use scientific process skills, while each individual learns something in daily life, scientist also uses his scientific process skills to reach a certain extent to conclude by establishing hypotheses (Germann, 1994; Liang, 2002; Bağci-Kilic, 2003). Individuals with a high degree of these skills can solve a problem they will encounter in their daily lives both in a short time and by using the appropriate method (Smith & Scharman, 1999; Aktamis, 2009). Basic skills form the basis of higher-level skills (Padilla, 1990; Rambuda & Fraser, 2004). Basic skills can be acquired by students starting from the pre-school period. In science education, which is presented in planned and programmed form during of preschool period, the awareness of the events and concepts of children is very effective in the development of scientific process skills (Campell & Jobling, 2012; as cited in Alabay, 2013). These skills should not be considered as a step but should be considered as a set of skills that will form a way of thinking (Ergin et al., 2005). For the individual to have scientific thinking, he/she must have acquired all of these skills (Aydoğdu, 2014). Beside high-level skills can be gained from secondary school. For this reason, individuals are expected to gain high-level scientific process skills as well as start secondary school education (Ergin et al., 2005). In this context, scientific process skills gains deepen from lower levels to higher levels (Çepni & Çil, 2009). Scientific process skills contribute to making students easier to learn in science lessons (Çepni et al., 1996), enabling students to be active and take responsibility for their learning (Innamorato, 1998). Students need to know scientific process skills to develop scientific understanding. In addition, individuals who think creatively while dealing with scientific works can use these skills more effectively (Meador, 2003). Identifying the problem, and testing hypotheses are among the most basic structures of scientific process skills. For this reason, it is assumed that people who can use their scientific process skills actively have better scientific creativity (Meador, 2003; Cheng, 2004). According to Creswell (2008), the scientific research process proceeds in the form of determining the problem, collecting data, determining the hypothesis(s), analyzing the data, then discussing the results and presenting suggestions. Suggestions in scientific studies are a guide for new researchers(s) following the presentation of the findings obtained as a result of research conducted in the conclusion and discussion section (Akçöltekin, 2021). When the relevant literature is examined, it has been determined that there are postgraduate theses whose content consists of scientific research-themed topics, and the sample group consists of "teachers", "pre-service teachers", "secondary school students" and "graduate students", and the suggestions in these theses are not compiled (Aydemir et al., 2017; Doğan, 2017). In

this context, the study was deemed worthy of research in terms of providing a consensus on these issues by classifying the suggestions in the theses, which have the concept of scientific research.

Problem Sentence of The Study

The problem sentence of the research is "What are the suggestion sentences of the postgraduate theses obtained for the criteria determined in HENTC?"

In these context subproblems are;

- What are the suggestion sentences in postgraduate theses with SR-themed conducted for teachers?
- What are the suggestion sentences in postgraduate theses with SR-themed conducted for pre-service teachers?
- What are the suggestion sentences in postgraduate theses with SR-themed conducted for secondary school students?
- What are the suggestion sentences in postgraduate theses with SR-themed conducted for graduate students?

Purpose of The Study

The study consists of the master's theses, which are in HENTC between 2000-2022. The themes of these were determined as SR. In addition, the suggestion sentences of the master's theses containing the sub-themes SRM, SRP, SC, and SSE were compiled. The sample groups of this postgraduate theses are "teachers", "pre-service teachers", "secondary school students" and "graduate students". Scientific research includes transforming data into information, enabling strategy formation, determining action points, and measuring the impact of the actions taken. Accordingly, it is thought that this research will help researchers to perceive and interpret the subject of scientific research from a different perspective. In this respect, this study is important in terms of creating a reference resource for many researchers and facilitating their research, and also reporting important information that increases the quality of education to its stakeholders.

METHOD

The qualitative research method was used in the research. In qualitative research, data is collected through observation, interviews, and documents (Berg & Lune, 2015). Document analysis is defined as finding resources, reading, taking notes, and evaluating them for a specific purpose (Karasar, 2005). It is also a qualitative research technique that, according to Wach and Ward (2013), helps to meticulously and systematically analyze the contents of written documents. Geray (2006) classified documents according to their qualities and environments such as text-based, image-based, sound-based, and visual-

based. Accordingly, the documents are written-based, film-based, computer-based, and portable based. Accordingly, "writing based" documents according to their qualifications and "on computer" documents according to their environment were used in this study. In the research, first of all, the problem sentence was determined and a literature review was then carried out for the problem sentence. Finally, the criteria for the theses to be used within the scope of the research were determined. The model used for this purpose is given in Figure 1.

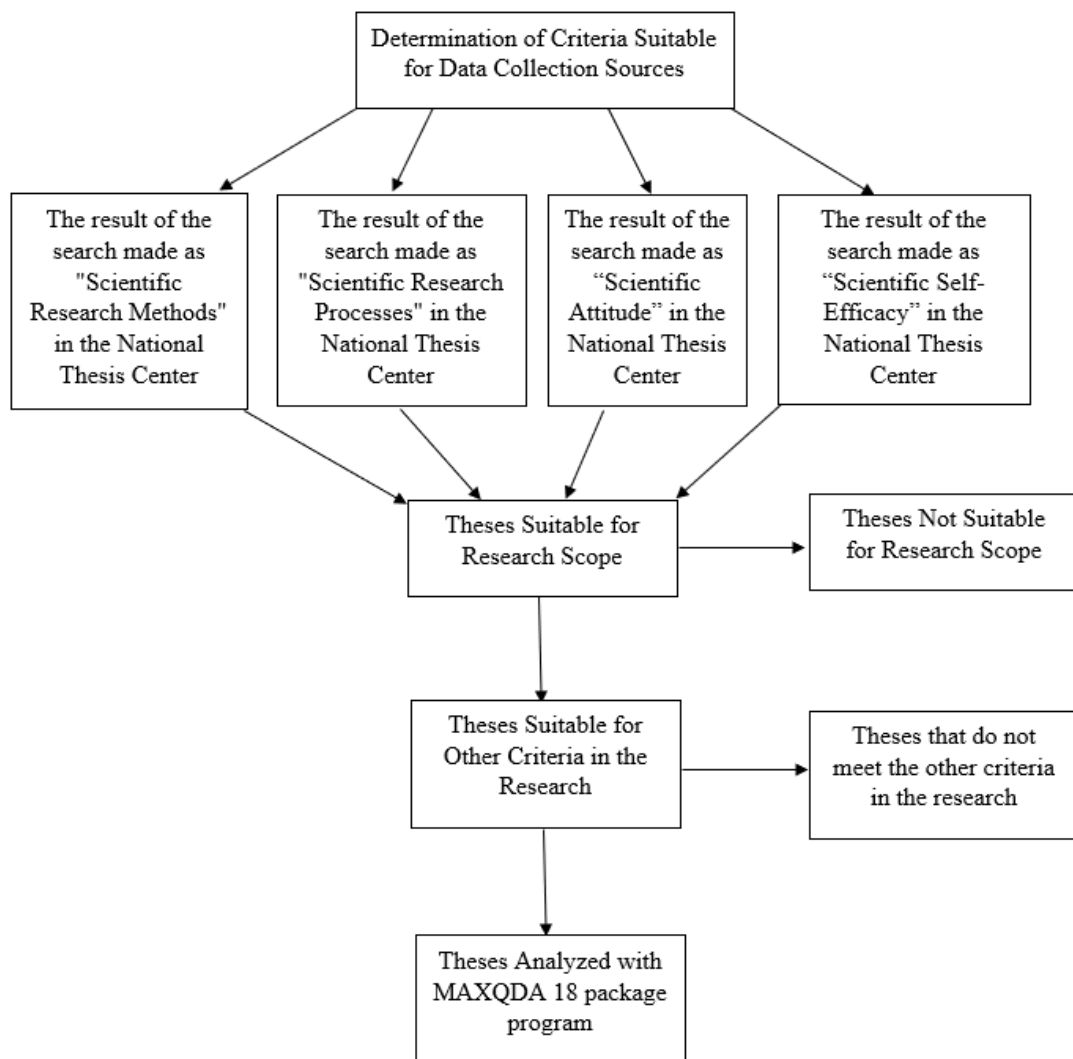


Figure 1. Research model

Uman (2011) stated that there are certain stages of systematic review in document analysis. According to these stages, the problem is determined, criteria suitable for the scope of the research are determined, and external and internal criteria for the criteria are determined. For this purpose, the data included in the scope are analyzed and interpreted. As stated in Figure 1, the criteria suitable for researching problems have been determined first. Subsequently, the criteria for data collection sources

were determined and internal and external criteria were established. The data of the master's theses included in the scope of the research were analyzed and then interpreted. Guba and Lincoln (1982) pointed out that qualitative research should be credible beyond validity and reliability, and proposed some criteria (Houser, 2015). These criteria have been included in the literature as mandatory standards. The criteria determined by Guba and Lincoln (1982) were grouped under 4 main headings as “credibility”, “reliability”, “applicability” and “transferability”.

Working Groups

By using SRM, SRP, SC, and SSE themes and the working groups consisting of teachers, pre-service teachers, middle school students, and graduate students, it was allowed to be accessed for postgraduate theses published in HENTC between 2000-2022 in Turkey,

From here, the suggestions sections of all postgraduate theses obtained for working groups were examined.

In the research, a total of 40 postgraduate theses, including 27 master's theses and 13 doctoral theses, were examined. The theses included in HENTC and examined within the scope of the study are given in Table 1 according to their chronological order, the type of the thesis, the classification number, the author, and the study groups.

Table 1. Theses in the Research

Thesis type	Classification number	Author(s)	Working group			
			Secondary school students	Teacher	Pre-service teachers	Graduate students
Master	M1	Yılmaz, F. (2005)		20		
Master	M2	Başdaş, E. (2007)	63			
Master	M3	Akpullukçu, S. (2011)	72			
Master	M4	Kılıç, B. (2011)	912			
Master	M5	Aydemir, S. (2012)			80	
Master	M6	Tuncel, H. (2012)	23			
Master	M7	Çakır, N.Ç. (2012)		100		
Master	M8	Orçan, B. (2013)				110
Master	M9	Şenbaşaran Uğuz, M.		20		
Master	M10	Karakuş, G. (2014)			65	
Master	M11	Kolaylı, T. (2015)			117	
Master	M12	Abik, N.M. (2017)	24			
Master	M13	Bolu, Y. (2017)	18			
Master	M14	Çanak, S. (2017)	194			
Master	M15	Efe-Kendüzer, S. (2017)		97	244	
Master	M16	Ayvar, İ. (2019)			43	
Master	M17	Tuncer, A. (2019)			440	
Master	M18	Öztürk, Z.D. (2019)	57			
Master	M19	Mutlu, O. (2019)		150		
Master	M20	Patar, A. (2019)	15			
Master	M21	Karaalioğlu, S. (2019)		174		
Master	M22	Karahan, M. (2019)	24			
Master	M23	Gültekin, M. (2019)	383			
Master	M24	Avcı, M. (2019)			329	
Master	M25	Çalık, İ. (2020)	93			
Master	M26	Tık, M. (2021)	44			
Master	M27	Semiz, T. (2021)			145	
Doctoral	D1	Afacan, Ö. (2008)	40			
Doctoral	D2	Ünal-Çoban, G. (2009)	65			
Doctoral	D3	Önen, F. (2011)			64	
Doctoral	D4	Ünal, C. (2012)			16	
Doctoral	D5	Kırılmazkaya, G. (2014)			78	
Doctoral	D6	Keçeci, G. (2014)	346			
Doctoral	D7	Gözüm, A.İ.C. (2015)		119		
Doctoral	D8	Aydemir, S. (2016)		21	19	
Doctoral	D9	Beinsenbayeva, L. (2017)				360
Doctoral	D10	Güney, K.K. (2018)	12			
Doctoral	D11	Bilgili-Kaya, S. (2018)	127			
Doctoral	D12	Baykara, H. (2019)			168	
Doctoral	D13	Kahraman, B. (2021)	21			

Table 1 presented that 19 of the postgraduate theses examined are for secondary school students, 6 for teachers, 11 for prospective teachers, and 2 for postgraduate students. In addition, 2 of these postgraduate theses are for both teachers and pre-service teachers

Data Analysis

The suggestions sections in the postgraduate theses obtained as a result of the examination of the documents by the researcher were reduced to thematic areas with the MAXQDA 18 package program.

The suggestion sentences in the postgraduate theses were grouped according to their similarities to each other. Dissimilar suggestion sentences were included in different groups. MAXQDA is a coding and analysis tool that can analyze different groups of documents collected from different times or regions separately or together. (Kuckartz, 2010).

FINDINGS

In this section, the findings related to the sub-problems of the research are mentioned. Findings are presented under 4 subheadings.

Findings for the first sub-problem

The first sub-problem of this research is "what are the suggestion sentences in postgraduate theses with SR-themed conducted for teachers? The results of the document analysis performed for the suggestion sentences given by the researchers in the postgraduate thesis whose working group is teachers are as in Figure 2.

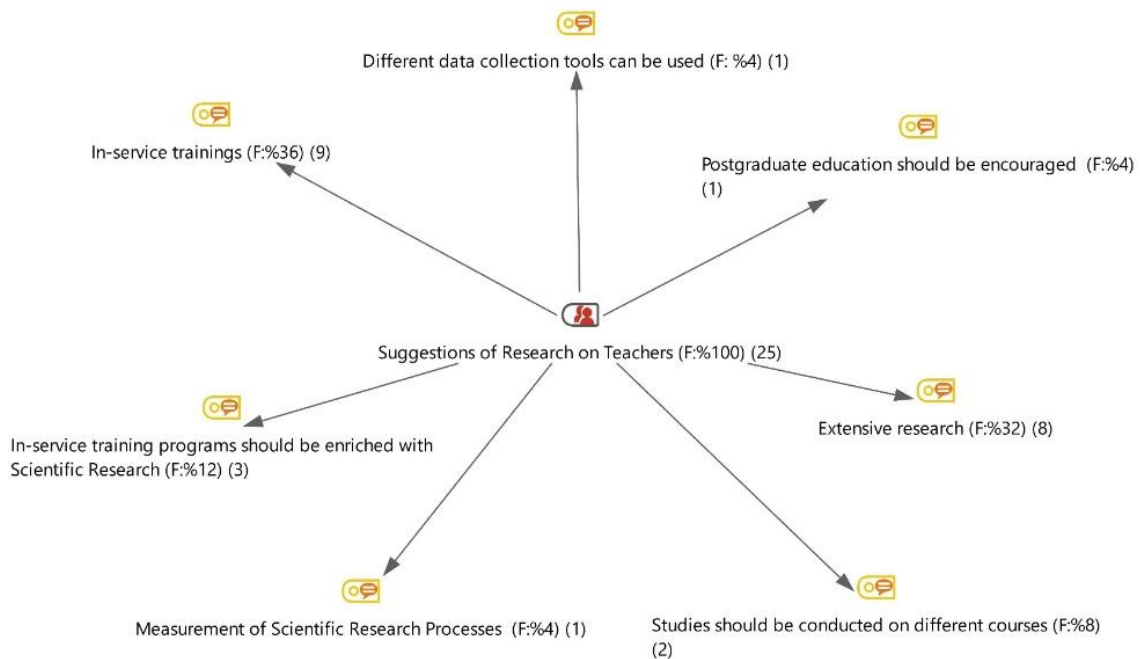


Figure 2. Suggestions of Research on Teachers

Figure 2 showed that suggestion sentences of the research performed on teachers were grouped under 7 different thematic areas. These thematic areas and their frequencies are as follows; "In-service training (f: 36%; n: 9)", "Extensive research (f: 32%; n: 8)", and "In-service training programs should be enriched with scientific research (%f: 12%; n: 3)", "studies should be conducted on different courses (f: 8%; n: 2)", "postgraduate education should be encouraged (f: 4%; n: 1)", "measurement of scientific research processes (f: 4%; n:1)", "different data collection tools can be used (f: 4%; n:1)".

The suggestion sentences emphasizing *"in-service training"* thema from the theses in which the data were collected are presented below

M21: *"To raise the scientific attitudes of teachers, it can be ensured that they receive in-service training on science-related issues (p.60)."*

D7: *"In-service training should be provided so that teachers can better structure socio-scientific issues in their minds (p.409)."*

M19: *"...The number of such in-service training for managers can be increased (p.55)."*

M7: *"...in-service training can be provided to increase their science self-efficacy and to make their scientific attitudes more positive (p:94)."*

Also, it is given as a reference the following suggestion for *"Extensive Research "* thema

M7: *"Wide research can be done to generalize the results (p.94)."*

Another thematic area of suggestion stated by the researchers was *"In-service training programs should be enriched with Scientific Research"* The suggestion sentences as referenced are as follows:

M18: *"... studies that complement the deficiencies of pre-service teachers in areas that are not considered sufficient can be done by faculty members (p.99)."*

In addition to the work conducted by the thesis authors themselves, the suggestion sentence for *"Studies should be conducted on different courses"* is as below

M1: *"... In this context, such a study should also be carried out in the Life Studies course (p. 88)"*

Another thematic area was *"postgraduate education should be encouraged"*. The suggestion sentence for this is

M19: *"... postgraduate education can be supported and even encouraged (p.55)."*

In addition to the data collection tools used in the research, the reference sentence for the *"different data collection tools can be used"* thema is as below

D8: *"... data collection tools that include different dimensions of scientific research can be used (p.85)"*

The last thematic area among the suggestion sentences given for the research was *"measurement of scientific research processes"*. The suggestion sentence in postgraduate theses is as below

M9: *"...Therefore, it may be more appropriate to bring the exams to a qualification where SCR (scientific research processes) skills can also be measured (p.118)."*

Findings for the second sub-problem

The second sub-problem of the research is " What are the suggestion sentences in postgraduate theses with SR-themed conducted for pre-service teachers? Findings related to this sub-problem are given in Figure 3.

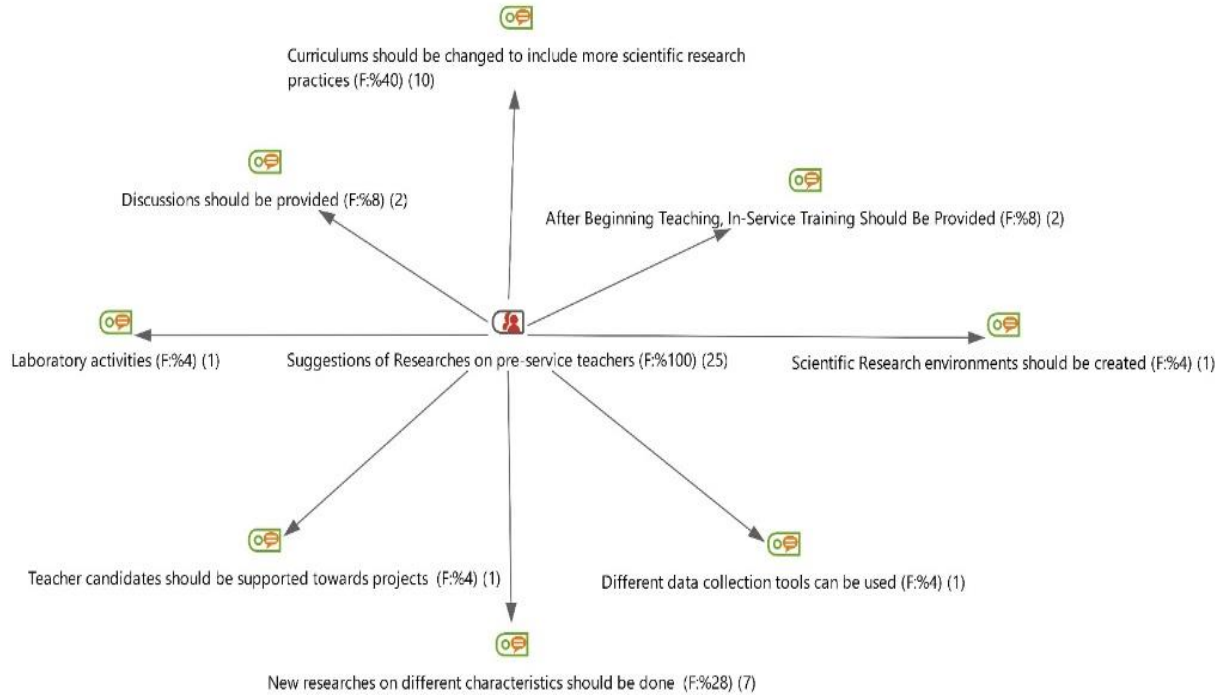


Figure 3. Suggestions for Research on pre-service teachers

As can be seen from Figure 3, 8 thematic areas were formed by coding the suggestion sentences presented by the researchers in the last parts of the postgraduate theses. These thematic areas are “curriculums should be changed to include more scientific research practices (f: 40%; n:10)”, “new research on different characteristics should be done (f: 28%; n: 7)”, “after beginning teaching, in-service training should be provided (f: 8%; n: 2)”, “discussions should be provided (f: 8%; n:2)”, “scientific research environments should be created (f: 4%; n: 1)”, “laboratory activities (f: 4%; n:1)”, “pre-service teachers should be supported towards projects (f: 4%; n: 1)” and "different data collection tools can be used (f: 4%; n:1)".

In the research conducted for the postgraduate theses, the suggestion that “*Curriculums should be changed to include more scientific research practices*” for the development of pre-service teachers has been the most frequently repeated. The reference sentences for these suggestions are as follows

M5: “...it is considered important to restructure teacher training programs, especially from the perspective of the nature of science and scientific research (p.159).”

M16: *“for the SRP process to be better understood by pre-service teachers and other learners, the number of lessons and weekly lesson hours of the lessons in which these gains are given can be increased... (p.162)”*,

M27: *“within the scope of teacher education, practical courses can also be included in the program in addition to the theoretical courses that include science, the nature of science, and scientific research (p.60).”*,

M10: *“...Scientific research methods course can be redesigned in a way that students can practice (p.129).”*

Another suggestion sentences that are frequently repeated in the postgraduate theses are “new research on different characteristics should be done”. References to this suggestion sentences are as follows

M27: *“...It is recommended that similar studies be conducted with different sample groups using different methods (p.60).”*,

M10: *“...the results obtained by conducting similar studies at both primary and high school levels can be compared (p.129).”*,

D4: *“...It should be increased in different age groups and different fields such as physics, chemistry, and biology (p.91)”*.

In the postgraduate theses, it has been suggested that “after beginning teaching, in-service training should be provided” for teachers. These suggestions are as follows

M11: *“...it is recommended to be implemented with in-service programs to be organized for post-service teachers (p.72).”* and

M5: *“in in-service seminars, it should be emphasized to science teachers how important the nature of science and scientific research is in terms of raising scientifically literate individuals... (p.159)”*

Another thematic area of suggestion that the authors stated for pre-service teachers in the postgraduate theses was that "discussions should be provided". The reference sentence for this field is as below

D12: *“Instead, there should be discussions about the elements of scientific research... (p.190)”*

When the suggestion sentences of the researchers were examined, 4 different thematic areas were formed, which were repeated with a frequency of 4%. Among these, the suggestion sentence for the field of “scientific research environments should be created” is as below

D12: “...It is necessary to create environments that will provide an opportunity to develop their views on scientific research (p.190).”

The reference sentence for the field “different data collection tools can be used” is as below

M5: “...data collection tools that include the nature of science and different dimensions of scientific research can be used in other studies (p. 159).”

The reference sentence for the thematic field of "laboratory activities" is as below

D5: “... these studies can be done with science subject areas and laboratory activities (p.:142).”

And lastly, the reference sentence to the proposal put forward as “Pre-service teachers should be supported towards projects” is as below

M27: “By supporting the participation of pre-service teachers in projects such as "2209-A University Students Research Projects Support Program" organized by the Scientific and Technological Research Council of Turkey, it can be ensured that they experience research processes and create a contemporary perception of scientific research and scientists (p.60).”

Findings for the third sub-problem

The third sub-problem of the research is “what are the suggestion sentences in postgraduate theses with SR-themed conducted for secondary school students?”. Findings related to this sub-problem are presented in Figure 4.

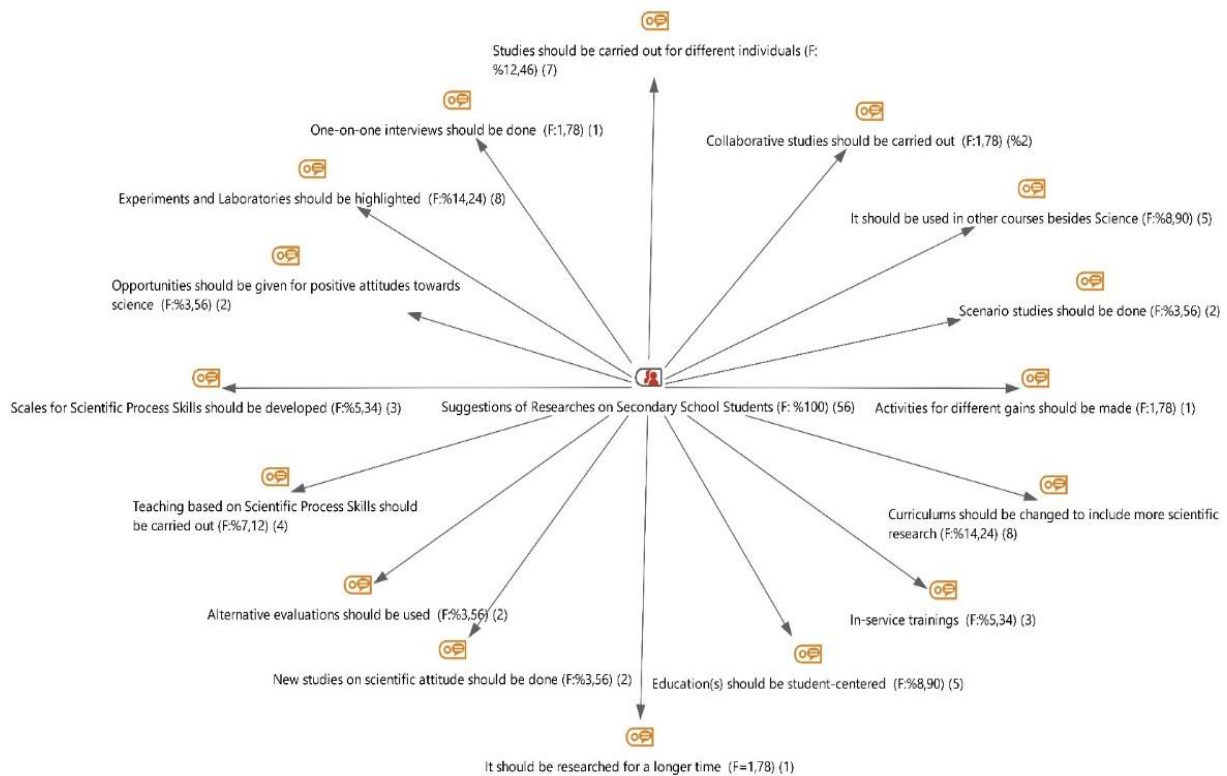


Figure 4. Suggestions for research on secondary school students

In the "studies on secondary school students", where the research is the most comprehensive, suggestions groups were formed in 16 different thematic areas. These groups and their frequencies are presented below.

These are “experiments and laboratories should be highlighted (f: 14.24%; n: 8)”, “curriculums should be changed to include more scientific research (f: 14.24%; n:8)”, “studies should be carried out for different individuals (f: 12.46%; n: 7)”, "education(s) should be student-centered (f: 8.90%; n: 5)”, “It should be used in other courses besides science (f: 8.90%; n: 5)”, “teaching based on scientific process skills should be carried out (f: 7.12%; n: 4)”, “scales for scientific process skills should be developed (f: 5.34%; n:3)”, “In-service trainings (f: 5.34%; n:3)”, “opportunities should be given for positive attitudes towards science (f: 3.56%; n: 2)”, “scenario studies should be done (f: 3.56%; n:2)”, “alternative evaluations should be used (f: 3.56%; n:2)”, “new studies on scientific attitude should be done (f: 3.56%; n: 2)”, “one-on-one interviews should be done (f: 1.78%; n:1)”, “It should be researched for a longer time (f: 1.78%; n:1)”, “activities for different gains should be made (f: 1.78%; n: 1)” and “collaborative studies should be carried out (f: 1.78%;n: 1)”.

The most frequently repeated code in the suggestion sentences of the researchers was “*experiments and laboratories should be highlighted*”. The references for this code are as follows:

D11: “*Experiments, in which students can develop their scientific process skills practically, should be mainly presented (p.219).*”.

M12: “*Recognizing that children's experiments and observations at school are different methods, and that science can sometimes be done by experiment and sometimes by observation, it is recommended that teachers clearly emphasize these features in the scientific research process (p.85).*”.

M23: “*It is thought that the experimental and observational studies and project studies carried out in the laboratory in the school environment will positively affect the scientific attitudes of the students (p.74).*”.

D11: “*With the guidance of the teacher, laboratory environments can be arranged where students are free, without being restricted, bored, comfortable, have fun, and can conduct their experiments in a sufficient amount of time (p.216).*”

Researchers suggested that “*Curriculums should be changed to include more scientific research*”. Suggestion sentences for this thematic dimension are as below

M14: “*Since the Science Applications without Research course is beneficial for scientific attitude, it is recommended to be removed from the elective course category and included in the compulsory courses (p.114).*”.

D11: *“Sufficient time is required for students to practice activities based on scientific process skills... However, to apply this model in other units as well, the number of aims in subjects with very intense content can be reduced (p.214).”*

M25: *“...However, it was seen that the majority of students' opinions on the theme of scientific knowledge being based on evidence were in the incomplete category. There is a need for methods and strategies to support the development of this theme (p. 69).*

Another frequently repeated suggestion in the written theses is *“Studies should be carried out for different individuals”*. The following sentences may refer to this suggestion:

D1: *“At the time of the research, the 2004 Science and Technology Curriculum had just been put into practice. 4th, 5th, and 6th-grade students were studying according to the new program, and 7th and 8th-grade students were studying according to the old program. For 7th and 8th grade students, a similar study can be conducted to see if there is a differentiation in students' thoughts about the new program (p.175).”*

D11: *“The participation of each of the students in the teaching activities should be ensured by paying attention to the heterogeneity of the groups in terms of characteristics such as gender and achievement (p.214).”*,

M26: *“The research was conducted with 7th-grade students. By determining the suitability of the subject, research can be carried out to examine the scientific attitude and understanding of the nature of science at other grade levels (p.67).”*

Researchers have said in their thesis suggestions that *“education should be student-centered”*. The following suggestion sentences can be used as references here:

M3: *“The successful participation of students in the activities at this stage is highly dependent on their scientific process skills. In this respect, necessary measures can be taken for teachers to give more importance to the scientific process skills that should be gained in lower grades (p. 130).”*

M20: *“To teach the imagination and creative nature of science more effectively, it would be beneficial to choose the activity topics from the subject areas that the students have previous knowledge of (p.116).”*

M12: *“It is recommended to have discussions in a way that children learn about the nature of scientific research while learning at schools. In this way, a more comprehensive perception of scientific research can be created (p.84).”*

The researchers suggested, *“It should be used in other courses besides science”*. The references to it are as below

D11: *“In addition, the development of scientific process skills is a lifelong process, so the learning method based on scientific process skills can be applied at all educational levels or in different courses (p.219).”*

M23: *“...it is thought that regulations and activities that will improve scientific attitude should be included not only in science courses but also in all courses (p.73).”*

Also, suggestion sentences for the thematic code of "Teaching based on scientific process skills should be carried out" are as below

D11: *“To positively change the attitudes and behaviors of students in social and socially focused subjects such as the human and environmental relations unit, scientific process skills-based teaching can be applied (p.219).”*

M12: *“Scientific research course, which is offered as an elective course in secondary school programs, can be taught with methods similar to scientific research and the nature of scientific research can be emphasized (p.85).”*

The researchers suggested that “Scales for Scientific Process Skills should be developed” as an alternative to the measurement tools they used. These suggestions are as follows

M26: *“The research conducted using the scientific attitude scale and the views on the nature of Science questionnaire can be repeated with other data collection tools, again using the historical approach (p.68).”*

D10: *“The fact that different results were obtained in the scientific process skills test compared to the interview necessitated a different SPS test for gifted students. It will be beneficial to carry out studies in this direction (p.237).”*

Another suggestion that the researchers repeated was "in-service training". The following sentences can be cited as a reference to this suggestion.

M12: *“Subjects should be reduced and teachers and students should be given time. Education and material support should be given to teachers (p.85).”*

D6: *“...it is thought that it would be beneficial to open in-service courses for classroom and science teachers (p. 128).”*

According to another suggestion sentence made by the researchers, the coded theme is “Opportunities should be given for positive attitudes towards science”. The suggestion sentences for this theme are as below

M23: *“Science activities and projects that will positively change the scientific attitude of students and teachers should be organized. The number of science fairs should be increased (p.74).”*

D11: *“As developing a positive attitude towards science is a process of work, students should be allowed to develop positive attitudes towards science from an early age (p.219)”*

The following sentence is a reference to another suggestion sentence group with the theme *“Scenario studies should be done”* in postgraduate theses.

M18: *“In line with the scenario worksheets containing the scientific research method steps used during the application, more detailed analyzes can be made about the changes in the scientific process sub-skills (identifying the problem, forming hypotheses, determining the variables, recording data, reaching conclusions) (p. 99).”*

Another theme addressed in the light of the suggestions obtained from the studies was that *“alternative evaluations should be used”*. The suggestion sentence for this theme is as below

D11: *“... Evaluation should be made with various assessment tools such as peer assessment, group assessment, performance assignments and product file preparation, which also evaluate the process (p.213).”*

The researchers stated the theme of *“new studies on scientific attitude should be made”* in the suggestion section. The suggestion sentence for this theme is as below.

M22: *“There are also studies that examine the relationship between the level of scientific attitude according to variables such as whether the school they are studying is a public or private school, the type of kindergarten they have completed, their academic achievement score, and repeating a grade (p.122).”*

D1: *“New studies can be conducted on the level of perception of the STSE (science-technology-society-environment) relationship and scientific attitudes of students according to the socioeconomic status of the families and the educational opportunities they offer to their children (p.175).”*

The frequencies of 4 different thematic areas reached as a result of the research were 1.78%. It can be said that one-suggestion sentence is given for each title within the scope of their frequencies. Suggestion sentence for the thematic area of *“one-to-one interviews should be made”* is as follows

D1: *“How reliable is the data collection tools answered by the students?” ...It is suggested that students can be interviewed one-on-one after the scale is applied to prevent the question (p.176)”*.

Another thematic area is the suggestion sentence about *“It should be researched for a longer time”*. The suggestion sentence for this theme is as below

D6: *“...Therefore, it is recommended that researchers who will practice research questioning should keep the guided research questioning phase for a longer time (p. 128).”*

Suggestion sentence for the view of the thematic field “activities for different gains should be made” is as below

M13: “Applications can be made by choosing the acquisitions and activities that will bring the targeted purpose in the scientific inquiry components of model-based science teaching (p. 130)”.

The last thematic area for the third sub-problem of the research was “collaborative studies should be carried out”. The suggestion sentence for this theme is as below

D11: “Since the family and the teacher need to cooperate for students to gain scientific process skills, comprehensive activities can be organized with the participation of families, students, and teachers (p.213).”

Findings for the fourth sub-problem

The fourth sub-problem of the research is What are the suggestion sentences in postgraduate theses with SR-themed conducted for graduate students?. Findings related to this sub-problem are presented in Figure 5.

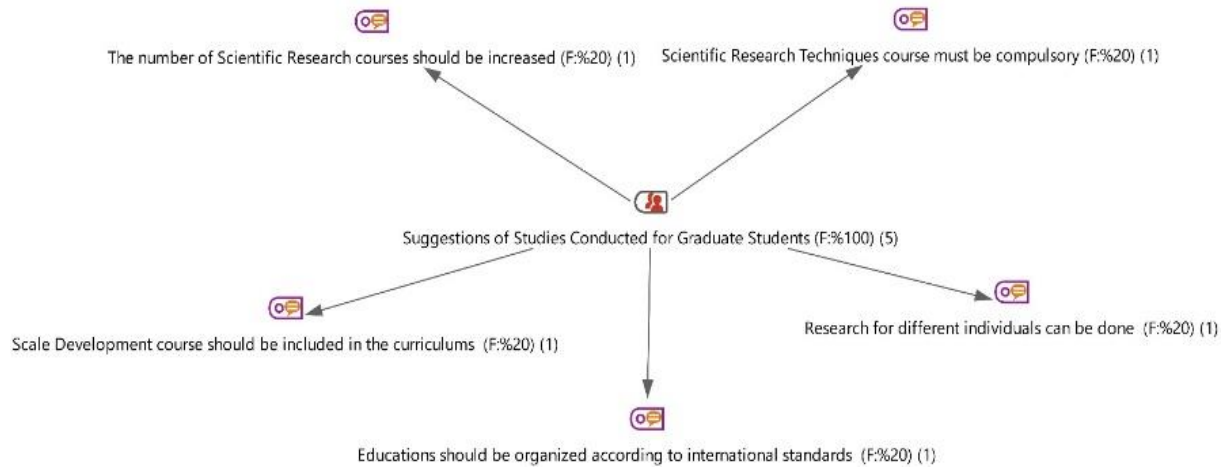


Figure 5. Suggestions for studies conducted for graduate students

As a result of the research, 5 different thematic areas were obtained from the postgraduate theses included in the sample. Each of these suggestions was repeated once. Accordingly, the thematic areas and frequencies are given below;

These are "Scientific research techniques course must be compulsory (F: 20%; N:1)", “The number of scientific research courses should be increased (F: 20%; N: 1)”, “Scale development course should be included in the curriculums (F: 20%; N: 1)”, “Educations should be organized according to international standards (F: 20%; N: 1)” and “Research for different individuals can be done (F: 20%; N: 1)”.

The first suggestion theme in the postgraduate theses is *"Scientific research techniques course should be compulsory"*. The view of this coding is as below

D9: *"...Scientific Research Techniques, Advanced Research Techniques are among the compulsory courses in the curriculum (p:239)"*.

The suggestion sentence for the thematic field *"The number of scientific research courses should be increased"* is as follows

D9: *"Within the framework of the importance of scientific research competencies in postgraduate education in scientific studies, the number of courses within this scope in the programs can be increased (p:240)."*

The reference sentence of the thematic field *"Educations should be organized according to international standards"* is as follows

D9: *"To gain scientific research competencies accepted at world standards within the scope of developing the scientific research competency perceptions of postgraduate students (p:239)."*

In addition to all this thema, a thema has also emerged that *"Research can be done for different individuals"*. The reference sentence for this theme is as follows

M8: *"This research is limited to postgraduate students. A similar study can be conducted with a wider academic community (experts, assistant professors, associate professors, etc.) in other studies (p: 60)"*

The last thematic area that emerged in the research conducted for graduate students is *"Scale development course should be included in the programs"*. The suggestion that led to the emergence of this thematic area is as follows:

D9: *"It is recommended that courses such as Scale Development should be included in graduate education programs to gain competencies for the development of data collection tools such as scales, questionnaires, and interview forms used to collect data in scientific research (p:239)."*

CONCLUSION and DISCUSSION

When the results obtained from the postgraduate thesis studies carried out with the teachers are examined; it was concluded that in-service training should be given to teachers for reasons such as increasing the scientific attitudes of teachers and structuring socio-scientific issues better and that scientific research-themed subjects should be mentioned and enriched more in the content of these in-service training.

In addition, the researchers recommended new research to be done in addition to their research. In the research on scientific research processes, it has been determined that new studies should be carried out on different courses. When the results for pre-service teachers are examined; In the majority of the studies carried out, it was concluded that the curriculum should be changed to include more scientific research

According to this result, it has been concluded that during the period of education, pre-service teachers should be updated in the education programs to increase the weekly course hours or the number of courses, and to include applied courses containing scientific research subjects in the programs. It was concluded that new studies involving different sample groups should be conducted.

It has been determined that the research on Scientific Research may reveal differences between the groups of pre-service teachers. In addition, results were obtained in the direction that laboratory activities should be carried out for pre-service teachers, providing environments where scientific research can be carried out, and pre-service teachers become more comprehensive and equipped with projects such as TUBITAK.

When the results of the thesis studies dealing with the scientific skills of secondary school students are examined; It has been determined that students' attitudes towards experiments are positive and this positive attitude will contribute to the development of students' scientific process skills. Aydoğdu and Ergin (2008) stated in the research they conducted that the experiments carried out enabled students to gain scientific process skills.

Another suggestion sentence that researchers make the most is that "curricula should be changed to include more scientific research". In this suggestion, the researchers mentioned that the "Science Applications" course, which is currently included in the education programs as an elective course, should be made compulsory to eliminate the deficiencies of the students.

Another finding of the research is that the curricula should be revised based on scientific research. In addition to this, the most prominent suggestion was to research different individuals. Considering this suggestion, it was concluded that scientific research-themed studies should be conducted with students at different grade levels. It can be concluded that scientific research is a cumulative process and students can be more successful in scientific research with new acquisitions that they will build on the basic competencies they have gained.

Researchers have frequently stated that the scientific research methods course should not only be associated with the science course but should also be aimed at other courses. It was concluded that while researchers are making new studies, studies should be done not only within the scope of science courses but also for other courses. In addition to the achievements determined in line with the needs of the

students, it has been determined that "scientific process skills-based teaching" environments should be provided and these should be supported by the students with laboratory activities.

When the lowest frequency research proposals are examined, it has been determined that research times are short, so longer-term studies should be carried out, activities that will reconcile students with other achievements should be carried out, and students should be in cooperation in the education they carry out using these processes. In addition to this, it was reflected in the results that the research that leads the students to the scientific research process should be more application-oriented.

Finally, when the results of the studies dealing with graduate students are examined, it is concluded that the scientific research techniques course given at the graduate level is left to the students' wishes to be an elective course, and in this context, the students will experience deficiencies according to their course choices. And it was concluded that the course of scientific research methods should be made compulsory. However, this suggestion is currently being implemented and scientific research method/technical courses are compulsory for all students at all postgraduate education levels. However, when other results are taken into consideration, it has been determined that the number of courses for scientific research also creates deficiencies in students, so the hours and types of these courses should be increased.

The researchers emphasized that the subjects that graduate students generally work on are "scale development", so "scale development" courses should be included in the program. When the results of all problems of the research are examined, it has been determined that "in-service training" plays an important role in eliminating the lack of scientific research Skills and training teachers. In addition, in the studies conducted for teachers, prospective teachers, secondary school students, and graduate students, they stated that scientific research courses should be included in the education programs. They emphasized that this course should not be an elective but a compulsory transfer to teachers and pre-service teachers. Finally, The Ministry of National Education and the Council of Higher Education should increase the frequency of training on Scientific Process Skills that everyone should have, and work on making teachers and pre-service teachers more aware of these issues.

Wang et al. (2017) examined and discussed the views of Chinese and American teachers on scientific research and the nature of science. In that study, in which the mixed research method was used, the connection of different cultures with science education was also discussed. As a result of that study, it was revealed that Chinese teachers' views on scientific research and the nature of science were at the traditional level. In addition, it was found that both views of American teachers were above the traditional level. As a result of all this, it was found that Chinese and American teachers gave importance to the nature of science rather than scientific research.

Suggestions

To increase teachers' attitudes towards the scientific research process, self-efficacy, etc., both in-service training should be organized and the content of this training should be rich in scientific research.

In this research, the suggestions of researchers for teachers, prospective teachers, secondary school students, and graduate students were examined, and it is suggested that other researchers conduct a qualitative study in which the opinions of academicians about these are examined.

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